Raft River and Almo Subwatershed
Water Quality Monitoring Project

Water Quality
Monitoring Plan
for

Raft River, Almo Subwatershed
Cassia County, Idaho

Developed for:

East Cassia Soil and Conservation District
Raft River Flood Control District
Idaho State Department of Agriculture

Prepared by:

Idaho Association of Soil Conservation Districts
Twin Falls Field Office
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Introduction

The Raft River is a tributary of the Snake River in south central Idaho. It originates in northwestern Utah in the Raft River Mountains and enters Idaho in southern Cassia County approximately 7 miles south of the town of Almo. From the Upper Raft River Valley at the Utah/Idaho border, it curves to the east to the Raft River Valley and then north to its confluence with the Snake River. There are approximately 75 river miles of the Raft River from the Utah/Idaho border to the Snake River. The Almo subwatershed is located in the Upper Raft River Valley, draining an area northwest of the Raft River from the Albion Mountains. There are several ephemeral and perennial tributaries to the Raft River draining from this subwatershed.

The Raft River has been placed on the EPA 303d list as a stream not meeting its designated uses and will have a Total Maximum Daily Load analysis done in 2002 for bacteria, dissolved oxygen, flow alteration, salinity, sediment and temperature. The watershed has suffered from serious riparian degradation in the past. The soils of the area are highly erosive and the river is subject to flashy flows, which create serious erosion problems where riparian degradation has been severe. The river channel is extremely incised and has abandoned its old floodplain. Cut banks of the incised channel are up to 12 feet high and deliver sediment directly into the channel by sloughing during high flows. Other effects include flooding due to the decrease in wetland water storage capacity and infiltration of storm water, and extreme low flows during summer months due to the decrease in groundwater recharge to the stream.

Background

In an effort to improve channel structure, riparian vegetation and hydrology of the Raft River and its tributaries, the East Cassia Soil Conservation District (SCD) and the Raft River Flood Control District have received funding through two programs to implement practices on the streams. Funding has been obtained through a 319 Nonpoint Source Grant for the Almo subwatershed and through a Wetland Reserve Program grant (WRP) for the Raft River itself. Practices and structures to be implemented and installed are nearly identical for both the Raft River and the tributaries and will consist primarily of channel structures such as rock and log drops, rock and tree revetments, bank barbs and channel revegetation. The intent of these structures is to slow the velocity of the stream to encourage deposition of sediment on the banks and an eventual raising of the streambed. Fencing will also be installed in some areas to control impacts to bank stability and revegetation efforts.

The agencies sponsoring these projects have suggested that water quality monitoring would be helpful in assessing the effectiveness of the structures to be implemented and have requested monitoring. Monitoring will provide baseline data and information on how effective the structures are in reducing sediment in the water column. This monitoring plan has been designed to assist the agencies involved and to meet the objectives stated in the following section.

Objectives

The Idaho Association of Soil Conservation Districts (IASCD) will work with the other agencies involved to meet the following objectives:

a) Provide baseline data of water quality and flow before implementation of structures.
b) Establish photo points to document stream corridor condition before and after implementation of BMPs.
c) Assess existing water quality conditions and impacts from agricultural activities.
d) Identify upland and agricultural areas of concern for implementation of BMPs to reduce sediment delivery.
e) Use the data for public awareness.

Monitoring Program and Sites

This monitoring program will be managed by (IASCD) with assistance from the Idaho State Department of Agriculture (ISDA), the Soil Conservation Commission (SCC), the East Cassia Soil Conservation District (SCD), Natural Resources Conservation Service (NRCS) and the Idaho Division of Environmental Quality (DEQ). IASCD and ISDA will conduct the fieldwork and supply the technical support, funding and equipment. Additional assistance for monitoring may be provided by SCC, NRCS or East Cassia SCD personnel.

There are 7 monitoring sites and are listed in Table 1. Samples and field measurements will be taken for the parameters in Tables 2 and 3 respectively. In addition, photo points will be established and taken at each site. This is described in the next section. The monitoring will be done twice per month through the irrigation season and once per month through the non-irrigation season until one complete year of monitoring is done.

Table 1 Site Descriptions

Site	Description
Raft1	Raft River below the Narrows; near USGS gage station
Raft2	Raft River above Edwards Creek confluence
Raft3	Raft River @ Utah/Idaho state line
EC1	Edwards Creek @ mouth to Raft River
EC2	Edwards Creek above Almo Creek confluence
EC3	Edwards Creek @ Elba/Almo Highway
AC2	Almo Creek @ town of Almo

Sampling Methods

Photo Points

Photographs will be taken at each site for each sampling event to document the condition of the stream channel corridor over time. Sites for the photo points will be selected in the field and will be marked and documented so each photo will be taken from the same location. These photos will be used as documentation of the visual condition of the stream corridor at each site and of any changes over time. Efforts will be made with other agencies to combine the photos with riparian and stream channel assessment and monitoring and to continue using the established points as photo points.

Water Quality

Samples for water quality analysis will be collected by grab sampling directly from the source. The sampling sites will be located away from any obstructions to avoid backwater effects within the channel. For incised shallow creeks or drains six one liter grab samples will be collected from a well-mixed section, near mid-stream at approximately mid-depth. For larger creeks, multiple grab samples will be collected at equal intervals across the cross section to provide a representative sample. For shallow sites (< 1ft) grab samples will be collected by hand using a clean one-liter stainless steel container. At sites where the water depth is greater than 1 foot, a DH-81 integrated sampler will be used. With all of the methods, individual samples will be collected at equal intervals across the entire width of the drain or creek. Each discrete sample will in turn be composited as mentioned in the following paragraph. The specific location, number of grabs and sample collection technique will be determined after observation of the conditions at each site.

Except for bacteriological samples, each grab sample will be composited into a 2.5 gallon polyethylene churn sample splitter. The composite sample will then be thoroughly homogenized and poured off into properly prepared sample containers. The polyethylene churn splitter will be thoroughly rinsed with source water at each location prior to sample collection. Bacteriological samples will be collected directly from the midstream discharge into properly prepared sterile sample bottles. Parameters, analytical methods, preservation and holding times are included in Table 2. All listed parameters may not be collected throughout the entire period of sampling and others could be added.

All sample containers will be equipped with sample labels that will be filled out using water proof markers and will indicate: station location, sample identification, date and time of collection. Clear packing tape will be wrapped around each sample bottle and label to insure that moisture from the coolers does not cause the loss of sample labels. All resultant samples will be placed in a cooler, on ice until delivery to the laboratory and will have Chain-of-Custody forms sealed in zip-lock baggies with each sample shipment. All samples will be taken to Magic Valley Lab, in Twin Falls, for analyses.

Table 2. Water Quality Parameters

Parameters	Sample Size	Preservation	Holding Time	Method
Non Filterable Residue (TSS)	200 ml	Cool 4°C	7 days	EPA 160.2
Total Volatile Residue (TVS)	200 ml	Cool 4°C	7 days	EPA 160.4
Fecal Coliform, Total Coliform	250 ml	Cool 4°C	30 hours	Standard Methods

Field Measurements

At each location, field measurements for dissolved oxygen, specific conductance, pH, salinity, temperature and total dissolved solids will be taken. These measurements will be taken, when possible, from a well-mixed section, near mid-stream at approximately mid-depth. Calibration of all field equipment will be in accordance with the manufacture specifications. Refer to the table below (Table 3) for a list of field measurements, equipment and calibration techniques.

Table 3. Field Measurements

Parameters	Instrument	Calibration
Dissolved Oxygen	YSI Model 55	Ambient air calibration
Temperature	YSI Model 55	Centigrade thermometer
Conductance, TDS and Salinity	Orion Model 115	Conductance standards
pH	Orion Model 210A	Standard buffer (7,10) bracketing for linearity

All field measurements will be recorded in a bound logbook along with any pertinent observations about the site, including weather conditions, flow rates, personnel on site, or any problems observed that may affect the quality of data.

Flow Measurements

Flow measurements will be collected by wading and using a Marsh McBirney Flow Mate Model 2000 flow meter. The six-tenth-depth method (0.6 of the total depth below water surface) will be used when the depth of water is less than or equal to three feet. For depths greater than 3 feet the two-point method (0.2 and 0.8 of the total depth below the water surface) will be used. At each station a transect line will be set up perpendicular to flow across the width of the drain or creek. The mid-section method for computing cross-sectional area along with the velocity-area method will be used for discharge determination. The discharge is computed by summation of the products of the partial areas (partial sections) of the flow cross-sections and the average velocities for each of those sections. This method will be used to calculate cubic feet per second at each of the monitoring stations.

Quality Assurance and Quality Control (QA/QC)

Magic Valley Labs uses EPA approved and validated methods. Laboratory QA/QC results generated from this project can be provided upon request. QA/QC procedures from the field sampling portion of this project will consist of duplicates (at least 10% of the sample load) along with blank samples (one set per sampling event). The field blanks consist of laboratory grade deionized water, transported to the field and poured off into prepared sample containers. The blank sample is used to determine the integrity of the field team's handling of samples, the condition of the sample containers supplied by the laboratory and the accuracy of the laboratory's methods. Duplicates consist of two sets of sample containers filled with the same composite water from the same sampling site. The duplicates are used to determine both field and laboratory precision. The duplicate samples will not be identified as such and will enter the laboratories blindly for analysis. Both the duplicates and blank samples are stored and handled with the normal sample load for shipment to the laboratory.

Data Handling

All of the field data and analytical data generated from each survey will be submitted to IASCD. Each batch of data from a survey will be reviewed to insure that all necessary observations, measurements and analytical results have been properly recorded. The analytical results will be reviewed for completeness and quality control results. Any suspected errors will be investigated and resolved if possible. The data will then be stored electronically for further review and preparation of final reports. A final report will be generated by IASCD and ISDA that summarizes the results of this monitoring program.